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Attorney's Docket No. 67,200-620

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Kuei-Hung Lee  
Serial No.: 10/ 044,014  
Filed: Jan. 11, 2002  
For: End Effector with Tapered Fingertips

Group Art Unit: 3652  
Examiner: Brahan, Thomas J.

Commissioner for Patents  
Alexandria, VA 22313

TRANSMITTAL OF APPEAL BRIEF (PATENT APPLICATION-37 CFR 192)

1. Transmitted herewith, in triplicate, is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on April 6, 2004.

NOTE: "The Appellant shall, within 2 months from the date of the notice of appeal under §1.191(a) or within the time allowed for response to the action appealed from, if such time is later, file a brief in "triplicate", 37 C.F.R. 1.192(a) [emphasis added].

2. STATUS OF APPLICANT

This application is on behalf of:

X other than a small entity.  
\_\_\_ a small entity.

A verified statement:

\_\_\_ is attached.  
\_\_\_ was already filed.

3. FEE FOR FILING APPEAL BRIEF

Pursuant to 37 CFR 1.17(f), the fee for filing the Appeal Brief is:

\_\_\_ small entity \$165.00  
X other than a small entity \$330.00

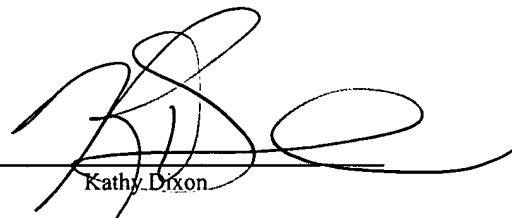
Appeal Brief fee due: \$ 330.00

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for Patents, Alexandria, VA 22313

  
Kathy Dixon

Dated: 6/4/04

4. EXTENSION OF TERM

NOTE: The time periods set forth in 37 CFR 1.192(a) are subject to the provision of ☐ 1.136 for patent applications. 37 CFR 1.191(d). See also Notice of November 5, 1985 (1060 O.G. 27).

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136 apply:

(complete (a) or (b), as applicable)

- (a) ☐ Applicant petitions for an extension of time under 37 CFR 1.136  
(fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

	Extension (months)	Fee for other than <u>small entity</u>	Fee for <u>small entity</u>
<input type="checkbox"/>	one month	\$ 110.00	\$ 55.00
<input type="checkbox"/>	two months	\$ 420.00	\$210.00
<input type="checkbox"/>	three months	\$ 950.00	\$475.00
<input type="checkbox"/>	four months	\$1,480.00	\$740.00

Fee: \$ \_\_\_\_\_

If an additional extension of time is required, please consider this a petition therefor.

(check and complete the next item, if applicable)

- ☐ An extension for \_\_\_\_\_ months has already been secured, and the fee paid therefor of \$ \_\_\_\_\_ is deducted from the total fee due for the total months of extension now requested.

Extension fee due with this request: \$ \_\_\_\_\_

or

- (b) ☐ Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

5. TOTAL FEE DUE

The total fee due is:

Appeal Brief Fee: \$ 330.00  
Extension fee (if any) \$ \_\_\_\_\_

TOTAL FEE DUE: \$ 330.00

6. FEE PAYMENT

X Attached is a Credit Card Payment Form for the sum of \$ 330.00

A duplicate copy of this transmittal is attached.

7. FEE DEFICIENCY

NOTE: If there is a fee deficiency and there is no authorization to charge an account, additional fees are necessary to cover the additional time consumed in making up the original deficiency. If the maximum six-month period has expired before the deficiency is noted and corrected, the application is held abandoned. In those instances where authorization to charge is included, processing delays are encountered in returning the papers to the PTO Finance Branch in order to apply these charges prior to action on the cases. Authorization to charge the deposit account for any fee deficiency should be checked. See the Notice of April 7, 1986, 1065 O.G. 31-33.

  X   If any additional extension and/or fee is required, this is a request therefor  
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And/Or

  X   If any additional fee for claims is required, please charge Visa Credit Card  
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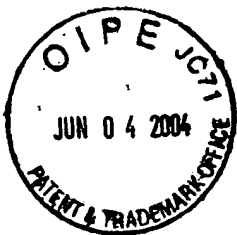
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/044,014

Applicant: Kuei-Hung Lee

Filed: 01/11/2002

Title: END EFFECTOR WITH TAPERED FINGERTIPS

Art Unit: 3652

Examiner: Brahan, Thomas J.

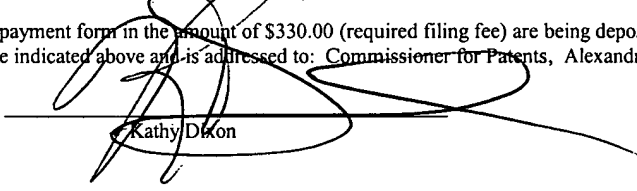
Attorney Docket No. 67,200-620

EXPRESS MAIL CERTIFICATE

Express Mail label Number EV 405 451 878-1/S

Date of Deposit JUNE 4/04

I hereby certify that this paper in triplicate and a credit card payment form in the amount of \$330.00 (required filing fee) are being deposited with the United States Postal Service via Express Mail on the date indicated above and is addressed to: Commissioner for Patents, Alexandria, VA 22313-1450.

  
Kathy Dixon

APPEAL BRIEF

Commissioner of Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This is Appellants' Appeal Brief in support of reversing the Examiner's rejection of claims 1 and 4-18 in the final Office Action of January 6, 2004.

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## I. REAL PARTY IN INTEREST

The real party in interest is Taiwan Semiconductor Manufacturing Company.

## II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

## III. STATUS OF THE CLAIMS

Claims 1 and 4-18 are pending in the case and all of those claims stand rejected.

## IV. STATUS OF THE AMENDMENTS

Appellants' claims were not amended after the final Office Action. Appendix I sets forth the claims that were rejected in the final Office Action.

## V. SUMMARY OF THE INVENTION

Independent Claim 1 recites "the tapered portion includes an angled surface formed at an angle ranging from about 2-8 degrees with respect to the substantially flat portion; and wherein thickness of the finger between the substantially flat portion of the bottom surface ranges from about 1.8-1.95 mm." Independent claim 14 recites "an end effector having at least one extension wherein each extension includes a top surface and a bottom surface and the extension having a free end, and the top surface having a substantially flat portion, and a tapered portion extending from the substantially flat portion towards the free end, and wherein the thickness of the extension between the substantially flat portion and the bottom surface is about 0.05-0.2 mm less

than the opening between the adjacently positioned semiconductor wafers in the cassette housing.” As such, Applicant’s claims an end effector extension (finger or blade) with an increased thickness over prior art end effectors. The increase in thickness of the finger portion of the end effector decreases the likelihood of the finger being broken off if the finger accidentally strikes wafer processing equipment or a wafer. See the instant application in the last two sentences of paragraph 33. The prior art relied on by the Examiner fails to establish a relationship between the thickness of the end effector finger, and a tapered free end to solve the problem of breaking of end effector fingers during wafer processing.

## VI. ISSUES

The following issues are involved in the appeal.

Issue I. Whether Claims 1 and 14-18 Have Been Properly  
Rejected Under 35 USC 103(a) as Being Unpatentable  
Over Shamlou Et Al

Issue II. Whether Claims 1 and 14-18 Have Been Properly  
Rejected Under 35 USC 103(a) as Being Unpatentable  
Over Shamlou et al in View of Chen et al

## VII. GROUPING OF THE CLAIMS

For purposes of this appeal, the claim do not all stand or fall together. The claims stand or fall according to the following separate groupings and are separately patentable by those groups.

GROUP I: Claims 1, 4, 5, 9-13 stand and fall together in this appeal.

GROUP II. Claim 6 is separately patentable in this appeal.

GROUP III. Claim 7 is separately patentable in this appeal.

GROUP IV. Claims 14 and 17 stand and fall together in this appeal.

GROUP V. Claim 15 is separately patentable in this appeal.

GROUP VI. Claim 16 is separately patentable in this appeal.

GROUP VII. Claim 18 is separately patentable in this appeal.

The basis upon which these groups and claims are separately patentable is set forth in the argument section of the brief.

## VIII. ARGUMENT

Claims 1 and 4-18 are remaining in this application.

Issue I. Whether Claims 1 and 14-18 Have Been Properly  
Rejected Under 35 USC 103(a) as Being Unpatentable  
Over Shamlou Et Al

Claims 1 and 4-18 have been rejected under 35 USC §103(a) as being unpatentable over Shamlou et al. Shamlou et al. has disclosed a wafer handling device having a rear shoe 20 that is formed so as to have a leading edge 122 that is tapered at an angle that permits the wafer to slide into a holding pocket between the front shoe 116 and the rear shoe 120 even when expansion differences between the handling blade and the semiconductor substrate would otherwise cause a misfit. See the paragraph bridging Columns 8 and 9. Shamlou et al. fails to disclose or suggest any relationship between the ability to have an end effector blade or finger with a tapered free end and an increase in the thickness of the blade or finger to prevent damage to the blade or finger during wafer handling. Applicants' claim 1 recites "the tapered portion includes an angled surface formed at an angle ranging from about 2-8 degrees with respect to the substantially flat

portion; and wherein thickness of the finger between the substantially flat portion of the bottom surface ranges from about 1.8-1.95 mm” which is not rendered obvious by Shamlou et al.

### **The Rejection Improperly Relies On the Level Of Routine Skill in The Art As Motivation To Modify The Reference**

The rejection of claims 1 and 4-18 under 35 USC 103 as unpatentable over Shamlou et al states: “Shamlou et al shows the basic claimed end effector with a tapered end (114). The dimensions of the blade and the cassette arrangement appear to approximate those claimed (an angle range including 10 degrees), as to have the slight differences considered as design expedients which would have been within the level of routine skill in the art at the time the invention was made. The large central portion (101) can be considered as a single finger, as recited in claim 4. The two small portions adjacent tips (114) can be considered as two fingers, as recited in claims 5 and 17.” “Within the level of routine skill” is not the test of obviousness under 35 USC 103. The rejection fails to identify sufficient motivation necessary to modify the prior art to arrive at the claimed invention, and therefore must be reversed.

### **The Shamlou et al Reference Teaches Away From Applicant’s Invention**

MPEP 2141.02 states:

#### **PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY, INCLUDING DISCLOSURES THAT TEACH AWAY FROM THE CLAIMS**

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984)

Shamlou et al teaches that the leading edge of the of the end effector blade should be formed at an angle of 10-30 degree, and thus teaches away from Applicant's claim 1 that recites an angled surface formed at an angle ranging from 2-8 degrees. The rejection fails to address or explain why a person of ordinary skill in the art would ignore the teaching away affect of Shamlou et al, and therefore the rejection must be reversed.

### **The Rejection Fails to Identify Sufficient Motivation**

MPEP 2143.01 states:

#### **FACT THAT REFERENCES CAN BE COMBINED OR MODIFIED IS NOT SUFFICIENT TO ESTABLISH *PRIMA FACIE* OBVIOUSNESS**

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

The rejection fails to provide any motivation to go against the teaching of Shamlou et al. Nor does the rejection provide a rational of why one would be motivated to reduce the angle of the tapered portion as opposed to increasing the angle above 30 degrees. The mere fact that the prior art could be modified does rinder the invention obvious.

### **The Rejection Improperly Relies On Drawings Not to Scale**

MPEP 2125 states:

#### **PROPORTIONS OF FEATURES IN A DRAWING ARE NOT EVIDENCE OF ACTUAL PROPORTIONS WHEN DRAWINGS ARE NOT TO SCALE**

When the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value. See *Hockerson-*

*Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956, 55 USPQ2d 1487, 1491 (Fed. Cir. 2000) (The disclosure gave no indication that the drawings were drawn to scale. "[I]t is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.").

The Examiner rejection is based on the improper position that "although Shamlou et al does not state the thickness of the blade, it does disclose that the length is 2.5 mm, and that the thickness is shown (in the drawings) to be less than the length and therefore would be approximately 1.8-1.95 as recited in the claims" (see the final Office Action of January 6, 2004 at page 3, paragraph number 4). Nothing in Shamlou et al states that the drawings are to scale and that the dimensions are accurate. Furthermore, the drawing must suggest the claimed invention as the solution to the problem solved, in this case, the solution to preventing end effector blades and fingertips from breaking. *In re Meng et al*, 181 USPQ 94, 97 (CCPA 1974). None of the references relied are directed toward solving the problem facing the inventor which is a part of the invention as a whole that must be considered in determining obviousness under 35 USC 103.

The Examiner has failed to establish a *prima facie* case with respect to independent claim 1. As such, the rejection is improper and must be reversed.

### **The Rejection Improperly Ignores Claim Limitations**

2143.03 states:

#### **All Claim Limitations Must Be Taught or Suggested**

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

With respect to claim 6, the rejection based on Shamlou et al fails to identify where the limitations “the tapered portion includes an angled surface formed at an angle ranging from 4-5 degrees with respect to the flat portion” can be found in the prior art or how the limitations would have been obvious therefrom. The rejection complete ignores claim limitations and therefore must be reversed.

With respect to claim 7, the rejection based on Shamlou et al fails to identify where the limitations “wherein the length of the tapered portion ranges from about 3-8 mm” can be found in the prior art or how the limitations would have been obvious therefrom. The rejection complete ignores claim limitations and therefore must be reversed.

With respect to independent claim 14, the rejection based on Shamlou et al is fatally defect for failing to point out where any of the claim limitations are found in the prior art – not to mention failing to provide any motivation of how and why the prior art should be modified to arrive at Applicant’s claim 14. For example, the rejection fails to identify where the limitations “and wherein the thickness of the extension between the substantially flat portion and the bottom surface is about 0.05-0.2 mm less than the opening between the adjacently positioned semiconductor wafers in the cassette housing” are found in the prior art or why such limitations would be obvious in view of the prior art. Shamlou et al was concerned about preventing damage to wafers, and was not facing the problem of preventing end effector blade and fingers from being broken. When the prior fails to recognize the problem facing the inventor, it cannot suggest the solution thereto. *In re Martin et al*, 152 USPQ 610, 615 (CCPA 1967). No prima facie case of obviousness has been established with respect to claim 14, and the rejection of claim 14 in view of Shamlou et al should be reversed.

With respect to claim 15, the rejection based on Shamlou et al fails to identify where the limitations “the tapered portion includes an angled surface formed at an angle ranging from 2-8 degrees with respect to the substantially flat portion” can be found in the prior art or how the limitations would have been obvious therefrom. The rejection complete ignores claim limitations and therefore must be reversed.

With respect to claim 16, the rejection based on Shamlou et al fails to identify where the limitations “the tapered portion includes an angled surface formed at an angle ranging from 4-5 degrees with respect to the substantially flat portion” can be found in the prior art or how the limitations would have been obvious therefrom. The rejection complete ignores claim limitations and therefore must be reversed.

With respect to claim 18, the rejection based on Shamlou et al fails to identify where the limitations “wherein the length of the tapered portion ranges from about 3-8 mm” can be found in the prior art or how the limitations would have been obvious therefrom. The rejection complete ignores claim limitations and therefore must be reversed.

Issue II. Whether Claims 1 and 14-18 Have Been Properly  
Rejected Under 35 USC 103(a) as Being Unpatentable  
Over Shamlou et al in View of Chen et al

Claims 1 and 4-18 have been rejected under 35 USC 103(a) as being unpatentable over Shamlou et al in view of Chen et al. The Examiner maintains that the lower limit (10 degrees) of the range of the angle of the wafer blade taught by Shamlou et al is “approximate” of that claimed. The Examiner relies on Chen et al for the generalized statement that the dimensions of the wafer blade may be adjusted. However, the Board’s attention is directed to Chen et al at

column 3, lines 3-13 which states “If the wafer diameter is increased, or decreased, the dimensions of the wafer support blade can be adjusted without exercise of the invention. The taper of the blade can be varied.” Thus, Chen et al teaches that the dimensions of the wafer support may be change only in response to changes in the dimensions of the wafer, and does not suggest a solution to the problem of breaking end effector fingers. Further, Chen et al fails to suggest how the support blade dimensions should be modified. Furthermore, Chen et al actually teaches away from Applicant’s claimed invention. The Examiner attention is respectfully directed to Figure 2 of Chen et al which shows the thickness for various portion of the blade as 1.5 mm, 1.0 mm, and 0.65 mm. Thus, Chen et al teaches that the upper limit of the thickness of the blade should be 1.5 mm, which teaches way from Applicant’s claimed range of 1.8-1.95 mm in claim 1. No prima facie case of obviousness has been established with respect to claim 1, and the rejection of claim 1 should be reversed.

With respect to claim 6, the rejection based on Shamlou et al and Chen et al fails to identify where the limitations “the tapered portion includes an angled surface formed at an angle ranging from 4-5 degrees with respect to the flat portion” can be found in the prior art or how the limitations would have been obvious therefrom. The rejection complete ignores claim limitations and therefore must be reversed.

With respect to claim 7, the rejection based on Shamlou et al and Chen et al fails to identify where the limitations “wherein the length of the tapered portion ranges from about 3-8 mm” can be found in the prior art or how the limitations would have been obvious therefrom. The rejection complete ignores claim limitations and therefore must be reversed.

With respect to claim 14, the rejection based on Shamlou et al and Chen et al is fatally defect for failing to point out where any of the claim limitations are found in the prior art – not to mention failing to provide any motivation of how and why the prior art should be modified to arrive at Applicant’s claim 14. For example, the rejection fails to identify where the limitations “and wherein the thickness of the extension between the substantially flat portion and the bottom surface is about 0.05-0.2 mm less than the opening between the adjacently positioned semiconductor wafers in the cassette housing” are found in the prior art or why such limitations would be obvious in view of the prior art. The rejection improperly ignores claim limitations and therefore no prima facie case of obviousness has been established. The rejection of claim 14 based on Shamlou et al and Chen et al must be reversed.

With respect to claim 15, the rejection based on Shamlou et al and Chen et al fails to identify where the limitations “the tapered portion includes an angled surface formed at an angle ranging from 2-8 degrees with respect to the substantially flat portion” can be found in the prior art or how the limitations would have been obvious therefrom. The rejection complete ignores claim limitations and therefore must be reversed.

With respect to claim 16, the rejection based on Shamlou et al and Chen et al fails to identify where the limitations “the tapered portion includes an angled surface formed at an angle ranging from 4-5 degrees with respect to the substantially flat portion” can be found in the prior art or how the limitations would have been obvious therefrom. The rejection complete ignores claim limitations and therefore must be reversed.

With respect to claim 18, the rejection based on Shamlou et al and Chen et al fails to identify where the limitations “wherein the length of the tapered portion ranges from about 3-8

mm” can be found in the prior art or how the limitations would have been obvious therefrom.

The rejection complete ignores claim limitations and therefore must be reversed.

Applicants note a typographic error in claim 1 which recites “and wherein thickness of the finger”. This should recite “and wherein the thickness of the finger”. Applicants request that the correction be made by Examiner’s Amendment if allowable subject matter is indicated. Otherwise Applicants will amend claim 1 during or after this appeal.

## IX. CONCLUSION

In view of the above errors in the rejections and Appellants’ arguments, Appellants respectfully request that the Board reverse the Examiners’ rejection of the claims remaining in the case.

Respectfully submitted

A handwritten signature in black ink, appearing to be "Randy Tung", is written over the typed name. The signature is stylized with a large, looping initial "R".

Randy Tung  
Reg. No. 31311  
248-540-4040

## LIST OF CLAIMS INVOLVED IN THE APPEAL

Claim 1 (previously presented): An apparatus for transporting a semiconductor wafer from one position to another position comprising:

an end effector having a base portion and at least one finger extending from the base portion, the finger having a top surface and a bottom surface and the finger including a free end, and wherein the top surface includes a substantially flat portion extending from the base portion, and wherein the finger includes a tapered portion extending from the substantially flat portion towards the free end;

wherein the tapered portion includes an angled surface formed at an angle ranging from about 2-8 degrees with respect to the substantially flat portion;

and wherein thickness of the finger between the substantially flat portion of the bottom surface ranges from about 1.8-1.95 mm.

Claim 2 (canceled).

Claim 3 (canceled).

Claim 4 (original): An apparatus as set forth in claim 1 wherein only a single finger extends from the base portion.

Claim 5 (original): An apparatus as set forth in claim 1 having at least two spaced apart fingers extending from the base portion.

Claim 6 (original): An apparatus as set forth in claim 1 wherein the tapered portion includes an angled surface formed at an angle ranging from about 4-5 degrees with respect to the substantially flat portion.

Claim 7 (original): An apparatus as set forth in claim 1 wherein the length of the tapered portion ranges from about 3-8 mm.

Claim 8 (original): An apparatus as set forth in claim 1 wherein the finger further includes a vacuum port hole formed therein for drawing a vacuum therethrough and gripping a flat object.

Claim 9 (original): An apparatus as set forth in claim 1 wherein the end effector is made from a material comprising a ceramic.

Claim 10 (original): An apparatus as set forth in claim 9 wherein the ceramic comprises at least one of alumina and silicon carbide.

Claim 11 (original): An apparatus as set forth in claim 1 wherein the end effector is made from material comprising a metal.

Claim 12 (original): An apparatus as set forth in claim 11 wherein the metal comprises aluminum.

Claim 13 (original): An apparatus as set forth in claim 1 further comprising a robot having a robot arm, and wherein the end effector is attached to an end of the robot arm, and wherein the robot is constructed and arranged to move the end effector in a plurality of directions.

Claim 14 (previously presented): An apparatus comprising:

a robot having a robot arm for movement in a plurality of directions, and an end effector secured to an end of the robot arm;

a wafer cassette housing having first and second side walls and a plurality of spaced apart ledges extending inwardly from each of the side walls constructed and arranged so that corresponding ledges on each side wall are positioned to support a semiconductor wafer, and the housing having a front face with an opening formed therein for loading and unloading the cassette housing with semiconductor wafers;

at least two spaced apart adjacently positioned semiconductor wafers supported by corresponding ledges extending inwardly from the first and second side walls of the wafer cassette housing to define an opening between adjacently positioned semiconductor wafers;

an end effector having at least one extension wherein each extension includes a top surface and a bottom surface and the extension having a free end, and the top surface having a substantially flat portion, and a tapered portion extending from the substantially flat portion towards the free end, and wherein the thickness of the extension between the substantially flat portion and the bottom surface is about 0.05-0.2 mm less than the opening between the adjacently positioned semiconductor wafers in the cassette housing.

Claim 15 (original): An apparatus as set forth in claim 14 wherein the tapered portion includes an angled surface formed at an angle ranging from about 2-8 degrees with respect to the substantially flat portion.

Claim 16 (original): An apparatus as set forth in claim 14 wherein the tapered portion includes an angled surface formed at an angle ranging from about 4-5 degrees with respect to the substantially flat portion.

Claim 17 (original): An apparatus as set forth in claim 14 further comprising a second extension and wherein the extensions are spaced apart from each other.

Claim 18 (original): An apparatus as set forth in claim 14 wherein the length of the tapered portion ranges from about 3-8 mm.

Claim 19 (canceled).

Claim 20 (canceled).